Assessing the Impact of Prompt Corrective Action on Bank Capital and Risk

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In December 1991, the U.S. Congress passed the Federal Deposit Insurance Corporation Improvement Act (FDICIA), which emphasized the importance of capital ratios in addressing the problems that led to the large number of bank and thrift failures in the 1980s. In addressing these issues, FDICIA contained two key provisions designed to reduce the cost and frequency of failed banks. First, FDICIA contained a provision for early closure of institutions that allowed bank regulators to close failing institutions at a positive level of capital. Such an early closure policy had been advocated as a solution to excessive losses to the deposit insurance fund, as discussed by Kane (1983). The second key provision of FDICIA, prompt corrective action (PCA), involved early intervention in problem banks by bank regulators. While PCA was intended to supplement the existing supervisory authority of bank regulators, FDICIA legislated mandatory intervention, rather than regulatory discretion, in undercapitalized institutions in an effort to save banks from becoming insolvent.

To date, the PCA provisions of FDICIA appear to have been a major success in improving the safety and

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soundness of the U.S. banking system. Failures declined precipitously in the years following the passage of FDICIA, while a casual observation of bank capital ratios and levels suggests that PCA has been successful in getting banks to increase capital. From year-end 1991 through year-end 1993, equity capital held by U.S. commercial banks in the aggregate increased by over \$65 billion, an increase of 28.0 percent, while the ratio of equity capital to assets increased from 6.75 percent to 8.01 percent.

While the adoption and implementation of PCA has focused attention on bank capital ratios, two issues merit further attention. First, did PCA cause banks to increase their capital ratios, or is the increase attributable to some other factor such as bank income levels in the early 1990s? Second, a number of theoretical and empirical studies suggest that increasingly stringent regulatory capital standards in general, and PCA in particular, may have the unintended effect of causing banks to increase their level of portfolio risk.

This paper examines the impact that the PCA standards had on bank portfolios following the passage of FDICIA in 1991. To do this, the simultaneous equations model developed by Shrieves and Dahl (1992), and later modified by Jacques and Nigro (1997) to study the impact of risk-based capital, is used to examine how PCA simultaneously influenced bank capital ratios and portfolio risk

levels. Unlike prior studies on this topic, by using a simultaneous equations model, the endogeneity of both capital and portfolio risk is explicitly recognized, and as such, the impact of possible changes in bank capital ratios on risk in a bank's portfolio can be examined.

THE PROMPT CORRECTIVE ACTION STANDARDS

In December 1991, the U.S. Congress passed FDICIA, with the PCA provisions becoming effective in December 1992. Specifically, Section 131 of FDICIA, defined for banks five capital thresholds used to determine what supervisory actions would be taken by bank regulators, with increasingly severe restrictions being applied to banks as their capital ratios declined. As shown in Table 1, banks are classified into one of five capital categories depending on how well they meet capital thresholds based on their total risk-based capital ratio, Tier 1 risk-based capital ratio, and Tier 1 leverage ratio.[1] For example, in order to be classified as well capitalized, a bank must have a total risk-based capital ratio greater than or equal to 10 percent, a Tier 1 risk-based capital ratio greater than or equal to 6 percent, and a Tier 1 leverage ratio greater than 5 percent, while adequately capitalized institutions have minimum thresholds of 8 percent,

4 percent, and 4 percent, respectively. If a bank falls into one of the three undercapitalized categories, mandatory restrictions are placed on its activities that become increasingly severe as the bank's capital ratios deteriorate. For example, undercapitalized banks are subject to restrictions that include the need to submit and implement a capital restoration plan, limits on asset growth, and restrictions on new lines of business, while significantly undercapitalized banks face all of the restrictions imposed on undercapitalized banks, as well as restrictions on interest rates paid on deposits, limits on transactions with affiliates and affiliated banks, and others. Finally, once a bank's tangible equity ratio falls to 2 percent or less, the bank is considered to be critically undercapitalized and faces not only more stringent restrictions on activities, but also the appointment of a conservator (receiver) within ninety days of becoming critically undercapitalized.[2]

Table 1 also shows the breakdown of insured commercial banks by PCA zone over the period 1991-93. For example, at year-end 1991, the time when FDICIA was passed, 10,725 banks, accounting for only 43.3 percent of the total assets in the U.S. banking system, were classified as well capitalized. In contrast, 221, 71, and 96 banks were classified as either undercapitalized, significantly undercapitalized, and critically undercapitalized, respectively. In total, 388 banks with 10.88 percent of all bank assets were undercapitalized to some degree at the end of 1991 and therefore faced at least some degree of regulatory sanction if their capital ratios did not improve by the time PCA went into effect.

By year-end 1992, the period after PCA provisions were announced but before they went into effect, the results in Table 1 show that well-capitalized banks numbered 10,989, accounting for over 87 percent of all bank assets, while all types of undercapitalized banks fell to only 142, thus accounting for less than 1 percent of total bank assets. A similar but less dramatic shift is seen in 1993, the first year the PCA regulations were in effect. By year-end 1993, 96.24 percent of banking assets were in banks classified as well capitalized, while only forty-eight banks were classified in the three undercapitalized zones, and those banks accounted for less than 0.25 percent of all banking

Table 1
CAPITAL THRESHOLDS AND BANK CLASSIFICATION UNDER PROMPT CORRECTIVE ACTION

Capital Threshold	Total Risk-Based Capital	Tier 1 Risk-Based Ratio	Tier 1 Leverage Ratio
Well capitalized	≥10%	≥6%	≥5%
Adequately capitalized	≥8%	≥4%	≥4%
Undercapitalized	<8%	<4%	<4%
Significantly undercapitalized	<6%	<3%	<3%
Critically undercapitalized	Tangible equity ≤ 2%		

NUMBER OF BANKS AND PERCENTAGE
OF TOTAL BANK ASSETS BY PCA ZONE

PCA Zone	1991	1992	1993
Well capitalized	10,725	10,989	10,752
	43.30	87.51	96.24
Adequately capitalized	807	335	171
	45.82	11.72	3.51
Undercapitalized	221	67	22
	10.17	0.29	0.11
Significantly undercapitalized	71	33	16
	0.39	0.17	0.12
Critically undercapitalized	96	42	10
	0.32	0.32	0.03

Source: Data are from the Office of the Comptroller of the Currency.

assets. These findings suggest that PCA had a significant announcement effect on bank capital ratios during 1992, as well as a significant implementation effect on capital ratios once the standards were implemented.

While PCA appears to have been effective in getting banks to increase their capital ratios, it has not been without its critics.[3] One criticism that has been levied against regulatory capital standards in general is that they may lead to increasing levels of bank portfolio risk. Research by Kahane (1977), Koehn and Santomero (1980), and Kim and Santomero (1988) has shown, using the mean-variance framework, that regulatory capital standards cause leverage and risk to become substitutes and that as regulators require banks to meet more stringent capital standards, banks respond by choosing assets with greater risk.[4] Thus, increases in minimum capital standards by bank regulators cause banks to increase not only their capital ratios, but also have the unintended effect of causing them to increase their level of risk.

While one of the primary purposes of early closure is to prevent banks from taking increasing levels of risk as they approach insolvency, recent research by Levonian (1991) and Davies and McManus (1991) demonstrates that early closure may fail to protect the deposit insurance fund from losses because it creates incentives for banks to increase portfolio risk by increasing their holdings of high-risk assets. As such, the design of the PCA standards has important implications not only for capital levels, but also for the level of risk, and ultimately, the safety and soundness of the banking system.

MODEL SPECIFICATION

To examine the possible impact of the PCA standards on bank capital ratios and portfolio risk levels, the simultaneous equation model developed by Shrieves and Dahl (1992) is modified to incorporate the PCA zones. In their model, observed changes in bank capital ratios and portfolio risk levels are decomposed into two components, a discretionary adjustment and a change caused by an exogenously determined random shock such that:

(1) $$\Delta CAP_{j,t} = \Delta^d CAP_{j,t} + E_{j,t};$$

(2) $$\Delta RISK_{j,t} = \Delta^d RISK_{j,t} + U_{j,t},$$

where $\Delta CAP_{j,t}$ and $\Delta RISK_{j,t}$ are the observed changes in capital ratios and risk levels for bank j in period t, $\Delta^d CAP_{j,t}$ and $\Delta^d RISK_{j,t}$ represent the discretionary adjustments in capital ratios and risk levels, and $E_{j,t}$ and $U_{j,t}$ are exogenous shocks. Recognizing that banks may not be able to adjust to their desired capital ratios and risk levels instantaneously, the discretionary changes in capital and risk are modeled using the partial adjustment framework. As a result:

(3) $$\Delta CAP_{j,t} = \alpha \, (CAP^*_{j,t} - CAP_{j,t-1}) + E_{j,t};$$

(4) $$\Delta RISK_{j,t} = \beta \, (RISK^*_{j,t} - RISK_{j,t-1}) + U_{j,t}.$$

Thus, the observed changes in bank capital ratios and portfolio risk levels in period t are a function of the target capital ratio $CAP^*_{j,t}$ and target risk level $\Delta RISK^*_{j,t}$, the lagged capital ratio CAP_{t-1} and risk levels $RISK_{t-1}$, and any random shocks. The target capital ratio and risk level are not observable, but are assumed to depend upon some set of observable variables including the size of the bank (*SIZE*), multibank holding company status (*BHC*), a bank's income (*INC*), changes in portfolio risk ($\Delta RISK_{j,t}$), and capital ratios ($\Delta CAP_{j,t}$), while the exogenous shock that could affect bank capital ratios or risk levels is the regulatory pressure brought about by PCA.

Specifically, *SIZE* is measured as the natural log of total assets and *BHC* is a dummy variable equal to 1 if a bank is affiliated with a multibank holding company. As Shrieves and Dahl (1992) note, size may have an impact on a bank's capital ratios and level of portfolio risk because larger banks have greater access to capital markets. For banks belonging to multibank holding companies, both capital and portfolio risk may be managed at the holding company level, thus resulting in these banks having lower target capital ratios and higher target portfolio risk levels than independent banks. Following Jacques and Nigro (1997), the ratio of net income to total assets, *INC*, is included to recognize the ability of profitable banks to increase their capital ratios by using retained earnings. In addition, as noted by the use of the partial adjustment

model, lagged capital ratios and risk levels are included to measure the fact that banks adjust their capital ratios and risk levels to their target levels over time.

To recognize the possible simultaneous relationship between capital and risk, $\Delta CAP_{j,t}$ and $\Delta RISK_{j,t}$ are included in the risk and capital equations, respectively. Shrieves and Dahl (1992) note that a positive relationship between changes in capital and risk may signify, among other possibilities, the unintended impact of minimum regulatory capital requirements, while Jacques and Nigro (1997) note that a negative relationship may result because of methodological flaws in the capital standards underlying PCA.[5] Empirical estimation of the simultaneous equations model requires measures of both bank capital ratios and portfolio risk. Following previous research, portfolio risk was measured in two ways, using both the total risk-weighted assets as a percentage of total assets (*RWARAT*) and nonperforming loans as a percentage of total assets (*NONP*).[6] Avery and Berger (1991) have shown that *RWARAT* correlates with risky behavior, while other studies, such as those by Berger (1995) and Shrieves and Dahl (1992), use nonperforming loans. With respect to capital, the leverage ratio is used because Baer and McElravey (1992) find it was more binding than the risk-based capital standards during the period under study.

Of particular interest in this study is the regulatory pressure variables. Consistent with Shrieves and Dahl (1992), this study uses dummy variables to signify the degree of regulatory pressure that a bank is under. Specifically, the PCA dummies are:

PCAA = 1 if the bank is adequately capitalized; else = 0.

PCAU = 1 if the bank is undercapitalized, substantially undercapitalized, or critically undercapitalized (hereafter referred to as undercapitalized); else = 0.

These variables allow banks across different PCA zones to respond differently, both in capital ratios and in portfolio risk. A priori, banks in the undercapitalized group, *PCAU*, would be expected to have the strongest response because PCA imposes penalties on their activities. Furthermore, adequately capitalized banks, *PCAA*, may increase their capital ratios or reduce their portfolio risk if they perceive a

significant penalty for not being considered well capitalized, or if they desire to hold a buffer stock of capital as a cushion against shocks to equity as argued by Wall and Peterson (1987, 1995) and Furlong (1992). Besides being included as a separate variable, PCA is included in an interaction term with the lagged capital ratios. The use of this term allows banks in different PCA zones to have different speeds of adjustment to their target capital ratios. As such, banks in the undercapitalized PCA zones would be expected to adjust their capital ratios at faster rates than better capitalized banks.

Given these variables, equations 3 and 4 can be written:

$$
\begin{aligned}
(5)\ \Delta CAP_{j,t} =\ & \delta_0 + \delta_1 SIZE_{j,t} + \delta_2 BHC_{j,t} + \delta_3 INC_{j,t} \\
& + \delta_4 \Delta RISK_{j,t} + \delta_5 PCAA + \delta_6 PCAU \\
& - \delta_7 CAP_{j,t-1} - \delta_8 PCAA \times CAP_{j,t-1} \\
& - \delta_9 PCAU \times CAP_{j,t-1} + \mu_{j,t};
\end{aligned}
$$

$$
\begin{aligned}
(6)\ \Delta RISK_{j,t} =\ & \lambda_0 + \lambda_1 SIZE_{j,t} + \lambda_2 BHC_{j,t} \\
& + \lambda_3 \Delta CAP_{j,t} + \lambda_4 RISK_{j,t-1} \\
& + \lambda_5 PCAA + \lambda_6 PCAU + \omega_{j,t},
\end{aligned}
$$

where $\mu_{j,t}$ and $\omega_{j,t}$ are error terms, and $PCAA \times CAP_{j,t-1}$ and $PCAU \times CAP_{j,t-1}$ are interaction terms, which allow a bank's speed of adjustment to be influenced by the PCA zone the bank is in.

EMPIRICAL ESTIMATION

As noted earlier, the FDICIA was passed in December 1991, with the PCA thresholds becoming effective in December 1992. This study covers the period after passage but before implementation (1992), and the first year the PCA standards were in effect (1993). In addition, because all of the capital ratios used in PCA are available beginning at the end of 1990, 1991 is used as a control period. As noted earlier, a significant decline in the number of all types of undercapitalized institutions occurred during the year after FDICIA was passed. This result is not surprising because restrictions would be placed on the activities of these banks beginning in December 1992. Alternatively, in studying the impact of the risk-based capital standards, Haubrich and Wachtel (1993) note that because the composition of bank portfolios can be changed quickly, and

because banks appear to have experienced a period of learning, the impact appears more clearly after the implementation date. The same argument may be true for PCA, although learning by banks may be less significant with regard to PCA because all of the capital ratios defined in the PCA standards had been in effect since at least December 1990.[7]

RESULTS

This study examines 2,552 FDIC-insured commercial banks with assets of $100 million or more using year-end call report data from 1990 through 1993.[8] The model is estimated using the two-stage least squares procedure, which recognizes the endogeneity of both bank capital ratios and risk levels in a simultaneous equation framework, and unlike ordinary least squares, provides consistent parameter estimates.

The results of estimating the simultaneous system of equations 5 and 6 are presented in Tables 2 and 3. Table 2 uses the ratio of risk-weighted assets to total assets ($RWARAT$) to measure portfolio risk, while Table 3 measures risk using nonperforming loans as a percentage of total assets ($NONP$). All of the variables included to explain variations in capital ratios and risk levels are statistically significant in at least some of the equations. Bank size ($SIZE$) had a negative and significant impact on capital ratios in two equations, while multibank holding company status (BHC) was consistently negative and significant in the capital equations. Income (INC) had a positive and significant impact on capital ratios in all equations, suggesting that one reason for increasing capital ratios by banks over the period studied was the increase in their income levels. The parameter estimates on lagged risk ($RISK_{j,t-1}$) in the risk equations range from 5.3 percent to 24.7 percent, while the parameter estimates on lagged capital ($CAP_{j,t-1}$) in the capital equations range from 6.2 percent to 8.9 percent. These results imply that banks

Table 2
TWO-STAGE LEAST SQUARES ESTIMATES OF PROMPT CORRECTIVE ACTION ON RISK (RWARAT) AND CAPITAL

Variable	1991 ΔCAP	1991 ΔRISK	1992 ΔCAP	1992 ΔRISK	1993 ΔCAP	1993 ΔRISK
INTERCEPT	0.005*	0.021*	0.005*	0.029*	0.007*	0.032*
	(7.57)	(2.89)	(6.77)	(6.33)	(8.46)	(7.62)
SIZE	-0.000	0.001**	0.000	-0.000	0.000	-0.000*
	(-1.27)	(1.71)	(0.66)	(-0.92)	(1.09)	(-1.97)
BHC	-0.001*	0.015*	-0.002*	0.004*	-0.003*	0.008*
	(-3.83)	(5.33)	(-5.64)	(2.48)	(-7.51)	(4.64)
INC	0.387*	—	0.551*	—	0.409*	—
	(20.32)		(26.47)		(14.71)	
CAP$_{t-1}$	-0.070*	—	-0.089*	—	-0.062*	—
	(-9.47)		(-11.39)		(-7.31)	
RISK$_{t-1}$	—	-0.144*	—	-0.069*	—	-0.053*
		(-13.11)		(-8.99)		(-7.74)
ΔCAP	—	1.351*	—	0.284*	—	0.552*
		(8.14)		(2.74)		(3.20)
ΔRISK	0.017*	—	0.014*	—	0.042*	—
	(5.47)		(4.24)		(2.61)	
PCAA	0.009*	0.037*	0.022*	-0.015*	0.027*	-0.024*
	(2.98)	(9.25)	(6.10)	(-4.32)	(3.72)	(-4.78)
PCAU	0.023*	0.037*	0.039*	-0.016*	0.024*	-0.037*
	(8.05)	(5.01)	(9.70)	(-2.40)	(3.17)	(-3.97)
PCAA × CAP$_{t-1}$	-0.135*	—	-0.301*	—	-0.389*	—
	(-2.92)		(-4.91)		(-3.19)	
PCAU × CAP$_{t-1}$	-0.319*	—	-0.627*	—	-0.129	—
	(-5.17)		(-6.75)		(-0.68)	
R^2	.218	.123	.271	.063	.146	.060

Note: *t*-statistics appear in parentheses.

* Significant at the 5 percent level.

** Significant at the 10 percent level.

adjusted their capital ratios and risk positions very slowly over this period to their target levels. Finally, Tables 2 and 3 show mixed results in assessing the relationship between changes in capital ratios and changes in risk. When portfolio risk was measured using *NONP*, the changes in capital ratios and risk were negatively correlated, but when portfolio risk was measured using *RWARAT*, the parameter estimates were positive. Thus, the relationship between changes in capital ratios and changes in risk during this period is not unambiguous. The goal of this study is to clarify this relationship by examining the possible simultaneous impact of the PCA standards on both bank capital ratios and risk levels.

IMPACT OF PCA ON CAPITAL

In examining the impact of PCA, the results in Tables 2 and 3 provide some rather interesting insights. In the capital equations of each table, the impact of the regulatory pressure variables are captured both by an intercept term (*PCAA* or *PCAU*) and a speed of adjustment term ($PCAA \times CAP_{t-1}$ or $PCAU \times CAP_{t-1}$). For adequately capitalized banks (*PCAA*), regulatory pressure had a positive impact on capital ratios in both 1992 and 1993, with the parameter estimate in most cases being at least 100 percent larger in 1992 and 1993 than in 1991. Furthermore, the speed of adjustment terms for adequately capitalized banks are statistically significant, being in most cases two to four times greater in 1992 and 1993 than in 1991. Taken together, these results suggest that in both 1992 and 1993, banks classified as being adequately capitalized increased their capital ratios and the speed with which they adjusted their capital ratios in response to PCA. Furthermore, this result is consistent with the hypothesis that banks held capital above the regulatory minimum as a buffer against shocks that could cause their capital ratios to fall below the adequately capitalized thresholds.

Table 3

TWO-STAGE LEAST SQUARES ESTIMATES OF PROMPT CORRECTIVE ACTION ON RISK (NONP) AND CAPITAL

Variable	1991		1992		1993	
	ΔCAP	ΔRISK	ΔCAP	ΔRISK	ΔCAP	ΔRISK
INTERCEPT	0.004*	0.001*	0.004*	0.001*	0.004*	0.000**
	(5.42)	(5.71)	(5.38)	(4.43)	(3.90)	(1.71)
SIZE	-0.000**	0.000	-0.000**	-0.000*	-0.000	-0.000
	(-1.67)	(0.38)	(-1.71)	(-4.07)	(-1.07)	(-0.23)
BHC	-0.001*	-0.001*	-0.002*	-0.001*	-0.003*	-0.000
	(-4.03)	(-2.55)	(-6.35)	(-3.11)	(-6.56)	(-1.07)
INC	0.436*	—	0.578*	—	0.594*	—
	(20.14)		(25.70)		(14.98)	
CAP_{t-1}	-0.078*	—	-0.089*	—	-0.086*	—
	(-10.14)		(-10.66)		(-8.62)	
$RISK_{t-1}$	—	-0.247*	—	-0.171*	—	-0.228*
		(-18.31)		(-11.78)		(-17.62)
ΔCAP	—	-0.011	—	-0.058*	—	0.076*
		(-0.61)		(-3.52)		(3.00)
ΔRISK	-0.295*	—	-0.476*	—	-0.957*	—
	(-5.43)		(-9.43)		(-6.43)	
PCAA	0.011*	0.000	0.015*	0.003*	0.036*	-0.000
	(3.55)	(1.11)	(3.67)	(4.84)	(4.14)	(-0.20)
PCAU	0.021*	-0.000	0.028*	0.000	0.034*	-0.006*
	(7.19)	(-0.37)	(6.35)	(0.35)	(3.67)	(-4.57)
$PCAA \times CAP_{t-1}$	-0.165*	—	-0.166*	—	-0.599*	—
	(-3.42)		(-2.47)		(-4.05)	
$PCAU \times CAP_{t-1}$	-0.302*	—	-0.414*	—	-0.601*	—
	(-4.66)		(-4.06)		(-2.52)	
R^2	.194	.134	.261	.078	.119	.144

Note: *t*-statistics appear in parentheses.

* Significant at the 5 percent level.

** Significant at the 10 percent level.

The same results appear to hold true for undercapitalized banks (*PCAU*), although the timing and magnitude of the changes appear somewhat different. The parameter estimates on *PCAU* are significantly different from zero in both 1992 and 1993, and in all cases, they are larger than during the control period. In addition, the speed of adjustment estimates are generally significant and of greater magnitude than during the control period, thereby suggesting that undercapitalized banks adjusted their capital ratios at much faster rates than their well-capitalized counterparts. Examining the results in Table 2, the parameter estimates on $PCAU$ and $PCAU \times CAP_{t-1}$ for 1992 are almost twice as large as the estimates for the control period, while the 1993 estimates are similar in magnitude or not significant. These results are not surprising because banks that were classified in one of the three undercapitalized zones at the end of 1991 faced regulatory sanctions if they did not significantly increase their capital ratios by the time the PCA standards went into effect in December 1992.

It is also interesting to compare the parameter estimates on *PCAU* and *PCAA* in the capital equations. In general, the estimates on $PCAU$ and $PCAU \times CAP_{t-1}$ are larger than similar estimates for adequately capitalized banks in 1992, but not in 1993. This result is also not surprising because undercapitalized banks faced severe restrictions on their activities once PCA went into effect, while adequately capitalized banks did not.

IMPACT OF PCA ON RISK

With respect to portfolio risk, the results in Tables 2 and 3 provide some evidence that the regulatory pressure brought about by PCA led both adequately capitalized and undercapitalized banks to decrease their level of portfolio risk. While the results with respect to risk in Table 3 are generally insignificant, when portfolio risk is measured using *RWARAT* (Table 2), the results suggest that adequately capitalized banks (*PCAA*) significantly decreased their portfolio risk in both 1992 and 1993, with the parameter estimate for 1993 being 60 percent larger than the estimate for 1992. In a similar manner, the parameter estimates for undercapitalized banks (*PCAU*) in Table 2 are

negative and significant in both 1992 and 1993, with the parameter estimate for 1993 being more than twice as large as the 1992 estimate. This is in sharp contrast to the results for 1991, where the parameter estimates for both adequately capitalized and undercapitalized banks are positive and significant, thus suggesting that these banks were increasing portfolio risk in the period before *FDICIA* was passed. For 1992 and 1993, the reduction in risk is not surprising because while PCA was announced in December 1991, sanctions and restrictions on banks became effective at the end of 1992. Therefore, if banks viewed the sanctions associated with PCA as being costly, they had a greater incentive once PCA became effective to reduce their portfolio risk level, and thereby reduce the probability of falling below the capital thresholds due to shocks to equity or income.

Finally, the 1992 parameter estimate on *PCAU* in Table 2 is almost identical to that on *PCAA*, a result that suggests that while both types of banks responded to the announcement of PCA by reducing risk, the reduction in risk by undercapitalized banks was not significantly different from that of adequately capitalized institutions. Given the results of the capital equations in Table 2 that undercapitalized banks had larger adjustments to their capital ratios in 1992 than in 1993, and recognizing that undercapitalized banks may be able to adjust their risk levels faster than they can adjust their capital ratios, it is possible that undercapitalized banks emphasized increasing capital rather than reducing risk in 1992. However, in 1993, the parameter estimate on *PCAU* in the risk equation of Table 2 is over 50 percent greater than the parameter estimate on *PCAA*. This provides some evidence that undercapitalized banks may have felt even greater pressure than adequately capitalized banks to reduce their level of portfolio risk once the PCA standards became effective.

CONCLUSION

The purpose of this paper has been to investigate the impact of the PCA standards on bank capital ratios and portfolio risk levels. The results suggest that during both 1992 and 1993, adequately capitalized and undercapitalized banks increased their capital ratios and the rate at

which they adjusted their capital ratios in response to the PCA standards. In addition, this study finds some evidence that the PCA standards led to significant reductions in portfolio risk, particularly in 1993, the year after PCA took effect. While these results do not guarantee that bank capital levels are adequate relative to the risk in bank portfolios, they do suggest that PCA has been effective in getting banks to simultaneously increase their capital ratios and reduce their level of portfolio risk.

1. In addition, FDICIA authorizes bank regulators to reclassify a bank at a lower capital category if, in the opinion of the bank regulators, the bank is operating in an unsafe or unsound manner.

2. The tangible equity ratio equals the total of Tier 1 capital plus cumulative preferred stock and related surplus less intangibles except qualifying purchased-mortgage-servicing rights divided by the total of bank assets less intangible assets except qualifying purchased-mortgage-servicing rights.

3. For example, see Peek and Rosengren (1996, 1997).

4. The mean-variance framework has been criticized by some because it fails to incorporate the effects of deposit insurance. See Furlong and Keeley (1989) and Keeley and Furlong (1990).

5. Shrieves and Dahl (1992) note that a positive relationship between changes in capital ratios and portfolio risk may also occur because of regulatory costs, bankruptcy cost avoidance, and managerial risk aversion.

6. Because loans made in a given year will not be recognized as nonperforming until a future period, we follow Shrieves and Dahl (1992) and use nonperforming loans in the following year. Thus, the *NONP* variable is the ratio of nonperforming loans to total assets from year-end 1992 through 1994.

7. Finally, a word of caution is necessary because this analysis may be complicated by other factors present during this time period, such as the end of the interim period for implementation of the risk-based capital standards and other provisions of FDICIA, all of which make it difficult to isolate and definitively assess the impact of the PCA provisions. Nevertheless, with the simultaneous assessment of changes in bank capital, portfolio risk, and the regulatory environment, this study is a significant improvement over our prior understanding of the impact of FDICIA, in general, and PCA, in particular.

8. As noted in endnote 6, because of the nature of nonperforming loans, *NONP* was calculated using year-end data from 1992 through 1994.

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